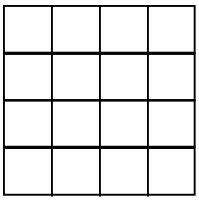
Same Area Different Perimeter

Objective: Students will discover that multiple rectangles can have the same area, yet their perimeter will be different.

Preparation: Graph paper, ¼" for each student. Sticky note for each pair of students with the area they will work on (see list following).

Introduction: Allow students to *Think, Pair, Share* situations in which we would use area. Draw two different rectangles (see below) on the board and ask the students if there is any way that these two rectangles could have the same area? (Discussion Time)

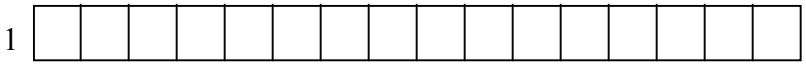
"Can both these rectangles have an area of 16 square units?" [YES]
Think, Pair, Share



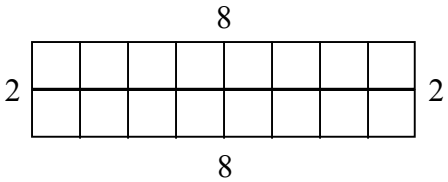
I Do:

The first could have sides of 1 unit and 16 units, therefore the area is 16 square units. The following rectangle could have sides of 4 units and 4 units, therefore also having an area of 16 square units. Together, find all the factors that have a product of 16 square units: 1 and 16, 2 and 8, 4 and 4. There are 3 different rectangles that can have an area of 16 square units.

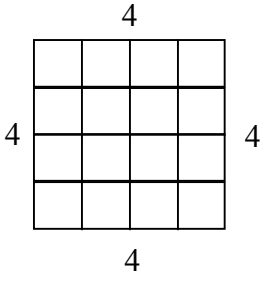
Use your factors identified to draw on graph paper the 3 rectangles with the factors as the length of each side. Identify the area in square units.



= 1 unit x 16 units (combine like terms)
= 1 x 16 x units x units
= 16 units squared



= 2 unit x 8 units (combine like terms)
= 2 x 8 x units x units
= 16 units squared



= 4 unit x 4 units (combine like terms)
= 4 x 4 x units x units
= 16 units squared

Next identify the perimeter of each rectangle by adding the four sides together. For example:

=1 unit + 1 unit + 16 units + 16 units

= 2 units + 32 units

= 34 units

We Do:

Follow the same procedure using 20 square units as the area. As a class, find the factors of 20: 1 and 20, 2 and 10, 4 and 5. Draw the rectangles on the graph paper, label all sides of the rectangles, and show the area of each rectangle in square units. Also identify the perimeter of each rectangle in units.

You Do: Cooperative Practice (Working with A Partner)

Give each pair of students an area to work with using the products listed below along with how many different rectangles can be made with that area. Students should find the factors, draw each rectangle using those factors as the length of each side in units, label and show the area in square units and the perimeter in units.

Area (put on post-it note)
12, 28, 32, 44, 48, 50, 54, and 56 each have 3 rectangles
24, 30, 40, and 42, each have 4 rectangles
36 has 5 rectangles

Explore: *Think, Pair, Share* What do notice about the area of each of the rectangles? How does the area change? Is there some sort of pattern? Are the perimeters different for each rectangle?

Extended the Activity:
Have students write an area question for each of the rectangles they drew.
AND/OR Have them share with classmates their rectangles.
AND/OR Have students pick a product of their own and follow the same procedure.

California State Standards

3MG 1.2 Estimate or determine the areas and volume of solid figures by covering them with squares or by counting the number of cubes that would fill them.
3MG 1.3 Find the perimeter of a polygon with integer sides.
4M.G. 1.0 Students understand perimeter and area

Common Core State Standards

3.MD. Geometric measurement: understand concepts of area and relate area to multiplication and to addition.
3.MD.5. Recognize area as an attribute of plane figures and understand concepts of area measurement.
3.MD.8. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters
4.MD.3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

Warm-Up

CST #83: 3MG2.3

One side of a rectangle is 8 feet long. Another side of the rectangle is 10 feet long. What are the lengths of the other 2 sides of the rectangle?

A) They could be any length.

B) 10 feet and 8 feet

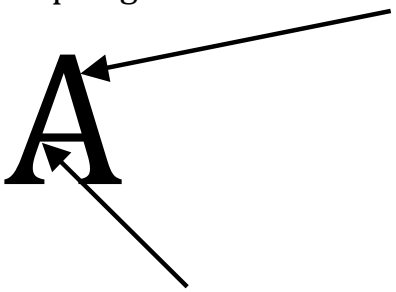
C) 10 feet and 10 feet

D) 8 feet and 8 feet

Review

Identify each angle as acute or obtuse.

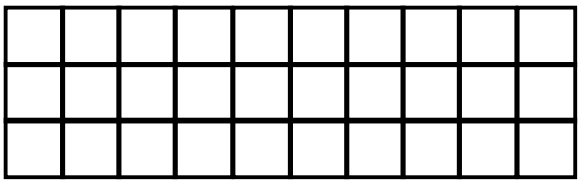
Identify the top angle inside of the A

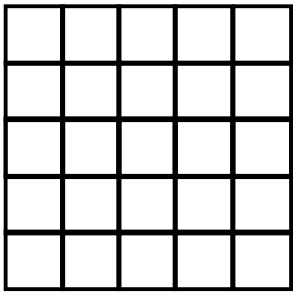


Identify the angle of the A as indicated by the arrow.

Current

Identify the **area and perimeter** for the rectangles below.



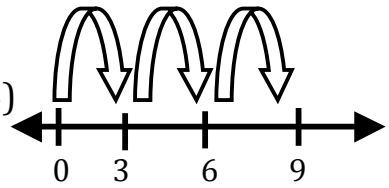


Other

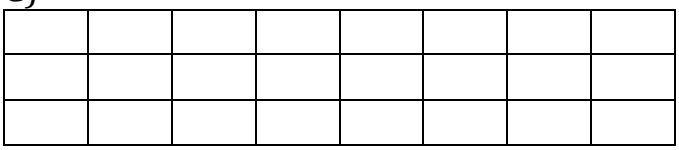
Which of the responses below are possible ways to show 6 × 3

A) 6 + 6 + 6

B)



C)



D)